

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
9 February 2006 (09.02.2006)

PCT

(10) International Publication Number  
**WO 2006/013423 A1**

(51) International Patent Classification<sup>7</sup>: **B01D 53/22,**  
71/02, C01B 3/50, H01M 8/06

Kentaro [JP/JP]; c/o Sumitomo Electric Industries, LTD.,  
5-33, Kitahama 4-chome, Chuo-ku, Osaka 541-0041 (JP).  
IHARA, Tomohiko [JP/JP]; c/o Sumitomo Electric Industries, LTD., 5-33, Kitahama 4-chome, Chuo-ku, Osaka 541-0041 (JP).

(21) International Application Number:  
**PCT/IB2005/002123**

(22) International Filing Date: 21 July 2005 (21.07.2005)

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
2004-216953 26 July 2004 (26.07.2004) JP

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(71) Applicants (for all designated States except US): TOYOTA JIDOSHA KABUSHIKI KAISHA [JP/JP]; 1, Toyota-cho, Toyota-shi, Aichi-ken 471-8571 (JP). SUMITOMO ELECTRIC INDUSTRIES, LTD. [JP/JP]; 5-33, Kitahama 4-chome, Chuo-ku, Osaka 541-0041 (JP).

(72) Inventors; and

(75) Inventors/Applicants (for US only): AOYAMA, Satoshi [JP/JP]; c/o Toyota Jidosha Kabushiki Kaisha, 1, Toyota-cho, Toyota-shi, Aichi-ken 471-8571 (JP). SATO, Hiromichi [JP/JP]; c/o Toyota Jidosha Kabushiki Kaisha, 1, Toyota-cho, Toyota-shi, Aichi-ken 471-8571 (JP). UEMURA, Takashi [JP/JP]; c/o Sumitomo Electric Industries, LTD., 5-33, Kitahama 4-chome, Chuo-ku, Osaka 541-0041 (JP). MIZUNO, Osamu [JP/JP]; c/o Sumitomo Electric Industries, LTD., 5-33, Kitahama 4-chome, Chuo-ku, Ōsaka 541-0041 (JP). YOSHIDA,

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2006/013423 A1

(54) Title: HYDROGEN PERMEABLE MEMBRANE, FUEL CELL AND HYDROGEN EXTRACTING APPARATUS EQUIPPED WITH THE HYDROGEN PERMEABLE MEMBRANE, AND METHOD OF MANUFACTURING THE HYDROGEN PERMEABLE MEMBRANE

(57) Abstract: A hydrogen permeable membrane (10) for selectively allowing hydrogen to permeate therethrough includes a metal base layer (12) containing vanadium (V), a metal coating layer (16) containing palladium (Pd), and an intermediate layer (14) that is formed between the metal base layer (12) and the metal coating layer (16) and made of a metal having a higher melting point than the metal base layer (12) and the metal coating layer (16) and possessing hydrogen permeability.